Non-invasive live imaging of stem cell signature metabolic states

Grant Award Details

Non-invasive live imaging of stem cell signature metabolic states

Grant Type: Basic Biology V

Grant Number: RB5-07458

Project Objective: The overall goal is to use noninvasive, fluorescence lifetime imaging (FLIM) to link metabolic changes to key genetic pathways known to regulate stem cells in adult tissues and pluripotent cells in the developing embryo.

Investigator:

Name:	Peter Donovan
Institution:	University of California, Irvine
Type:	PI

Human Stem Cell Use: Adult Stem Cell, Embryonic Stem Cell

Award Value: $516,366

Status: Closed

Progress Reports

Reporting Period: Year 1

View Report

Reporting Period: Year 2

View Report

Grant Application Details

Application Title: Non-invasive live imaging of stem cell signature metabolic states

Public Abstract:

Stem cells in tissues exhibit unique metabolic states that could distinguish them from other more specialized cells. Using a new type of microscopy we can image the metabolic states of cells in living tissues and, therefore, attempt to identify stem cell populations. Because stem cells can give rise to tumors that are metabolically very different from normal tissues, being able to identify cells that are about to form tumors could be immensely useful for early cancer diagnosis. Such methods can also be used to study embryonic stem cells as a model of early development, thus providing new information about early development and the risks to the embryo from the environment. along a continuum of oxidative phosphorylation and glycolysis that can be used to distinguish them from differentiated daughters and from surrounding niche cells. If successful these methods could be used in clinical settings for better diagnoses of human disease.

Statement of Benefit to California:

A goal of Prop 71 is to take basic stem cell research to clinical application. Disability and loss of earning power and personal freedom resulting from a disease are devastating, creating a financial burden for the State in addition to suffering caused to patients and families. Therapies using human stem cells have the potential to change millions of lives. Using hES cells as disease models will help us understand the underlying causes of disease and aid in the development of drugs to treat them. Our research is aimed at identifying key changes in stem cells in normal development and disease. These studies could aid in understanding normal developemnt, risks to the embryo, as well as early cancer detection. Anticipated benefits of our research include:
1.Development of new cell-based treatments for diseases
2.Improved methods for understanding development and risks to the embryo
3.New methods for detecting effects of toxicants in the environment/workplace
4.Development of new methods for developing drugs for treating disease
5.Transfer of new technologies and IP to the public realm with resulting revenues coming to the state
6.Creation of new biotechnology companies based on new IP
7.Creating research teams with a competitive edge for obtaining out of state funding
8.Creation of new jobs in the biotechnology sector.

It is anticipated that, in the long term, the return to the State in terms of revenue, health benefits for its Citizens and job creation will be significant.

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